

## Accepted Manuscript

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PII: S0165-2370(18)30401-7  
DOI: <https://doi.org/10.1016/j.jaap.2018.06.022>  
Reference: JAAP 4359

To appear in: *J. Anal. Appl. Pyrolysis*

Received date: 3-5-2018  
Revised date: 14-6-2018  
Accepted date: 19-6-2018

Please cite this article as: Debiagi P, Gentile G, Cuoci A, Frassoldati A, Ranzi E, Faravelli T, A PREDICTIVE MODEL OF BIOCHAR FORMATION AND CHARACTERIZATION, *Journal of Analytical and Applied Pyrolysis* (2018), <https://doi.org/10.1016/j.jaap.2018.06.022>

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# A PREDICTIVE MODEL OF BIOCHAR FORMATION AND CHARACTERIZATION

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## Highlights

- Biomass origin and structure affect composition and yield of pyrolysis biochar.
- Operating conditions of thermal treatment affect composition and yield of pyrolysis biochar.
- Further pyrolysis reactions modify young biochar structure and release gas products.
- A predictive kinetic mechanism of biomass pyrolysis accounts for all these effects.
- Large collection of literature experimental data supports the validation of the kinetic mechanism.

## Abstract

Biomass is increasingly being recognized as a promising carrier for both heat, energy and chemicals production. However, several aspects still require intense research activity towards a better design and optimization of industrial combustors, gasifiers and pyrolyzer. The objective of this work is to update the CRECK kinetic mechanism of biomass pyrolysis, allowing a better prediction of both yield and composition of the solid residue (biochar). Moreover, further model modifications allow to better describe the variability of hemicellulose in different biomass. To this end, a large set of literature experimental data is collected and organized into a database, which is used to further tune and validate the proposed kinetic mechanism. Although the kinetic model maintains the

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